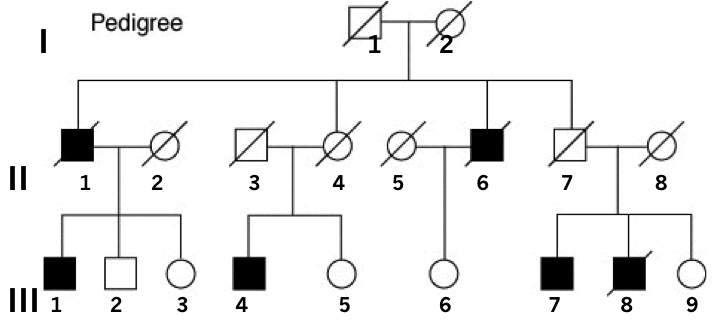
**Pedigree Construction/ Tracing Genes**

*In this activity, you must read the story and construct an appropriate pedigree on chart paper.*

Once the pedigree is constructed, write the correct genotype of each person in the family underneath their symbol. What is the mode of inheritance?

Not all pedigrees will show carriers because technically, being a carrier isn’t a phenotype and pedigrees show phenotypes. You must show carriers in your work (if applicable) by drawing a half-shaded symbol. You can depict a female sex-linked carrier by drawing a big dot in the circle.

Assume anyone ‘marrying in’ to a family is normal and not a carrier (unless told).

**Tracing Genes Through Pedigrees:**

**Recessive Traits:**

1. Construct a pedigree
2. Record the genes for the people with the recessive traits. Write two recessive genes in their symbols.
3. For all people without the recessive trait, assign one dominant gene in the symbol.
4. For all parents with a child with the recessive trait, assign each parent one recessive gene.
5. For all other people with one dominant gene, place a “-“ next to the dominant gene. This represents the fact that the individual may be homozygous dominant or heterozygous.

**Dominant Traits:**

1. Construct a pedigree.
2. For all people without a dominant trait, record two recessive genes in their symbol.
3. For all people with a dominant trait, record one dominant gene in their symbol.
4. For all parents with a child that has two recessive genes, assign each parent one recessive gene.
5. For all other people with one dominant gene, place a “-“ for the second gene.

**Sex-Linked Traits:**

1. Construct a pedigree.
2. For all males, place a “Y” chromosome in their symbol.
3. For all people with the sex-linked trait:
   1. Males: place a recessive gene besides the “Y” chromosome.
   2. Females: place two recessive genes in their symbol.
4. For all males without the sex-linked trait, record the dominant gene besides the “Y” chromosome.
5. For females without the sex-linked trait record one dominant gene in their symbol.
6. For all females that have a child with a sex-linked trait, record a recessive gene in their symbol.
7. If there is a female that is a carrier and her father does not have the sex-linked trait, then the carrier’s mother is also a carrier.
8. For all other females, place a “-“ next to the dominant gene.

**Case 1:**

**The Dwarfish Family**

Kerry Johnson married a lovely woman named Jeannie Dreamer. The only peculiar thing about Jeannie is that she was actually a dwarf. She was born with acondroplasia (short-limbed dwarfism). She told her husband about her dad, Davie Dreamer who was also a dwarf. He married a beautiful tall blonde girl named Ashley LeMarr, and they had three kids, Jeannie included. Jeannie had a brother who was four years older than her, and a sister two years older. Her brother, Bill was also a dwarf. Her sister, Angeline, was normal height and went on to marry a lovely man named Gerald. They had a daughter, Monique, who is of normal height.

Kerry Johnson has two sibings. Kerry was the firstborn, with Derek being his youngest sibling and Deena being a middle child. His parents, Joel and Nancy Grace were both over six feet tall. Kerry’s brother Derek married a pretty girl named Louise. Together they had fraternal twin sons, Bart and Bort.

**Case 2:**

**Duchenne Muscular Dystrophy**

Jake was depressed ever since he was diagnosed with Duchenne’s Muscular Dystrophy. This disease was causing his muscles to waste away. There was little he could do to stop it. And worse, he knew that this was genetic. It was weird, but his brother also had it. Harold, Jakes older brother had DMD from a younger age. At least Harold married Diana before he got diagnosed, thought Jake. They had a young child, Michael, who didn’t seem to show signs of the disease. Jakes sister, Doreen, seemed fine, but she was younger than him but who knew. Either way, she was married to a man named steve and they had two young kids, Jughead and Ethel. Sadly, Jughead died in a freak stroller accident.

Jakes father and mother seemed normal enough. His mom, Geraldine, was a war bride. His dad, Jacques, was a mysterious Frenchman, and no one knew anything else about his family. Either way, he was a kind and loving father. Jakes grandfather on his moms side passed away at a young age. They assume this is due to DMD. His grandmother was fine, but died of a stroke two years ago. His grandmother had two siblings, Mark and Pauline. Pauline married Greg, and they have two sons, Mike and Ike. Mike might be showing signs of DMD. That worries Jake.

**Case 3**

**Cystic Fibrosis**

A few weeks after Tania was born, she was diagnosed with cystic fibrosis. Her parents, Helen and Dave, had two additional children, Christy and Mark, and had each tested in vitro. Neither has CF. Mark is a carrier, Christy is not. When Dave's sister Josephine found out that Tania had CF, she immediately had a sweat test done on her son Joe. Joe had a negative sweat test. She then had herself tested genetically to see if she carried CF. She tested negative for CF genes as did her husband Steve. Josephine and Steve later had a daughter, Sue. Dave's other sister Mary, and Helen's brother Bob do not have CF and have not had themselves tested. Dave knows little about his parents, but Helen found out that her deceased father had a brother who died at a young age from CF. Her mother’s family never had any genetic diseases,

**Case 4**

**Dimples….not a disease, but still genetic**

Grandfather and Grandmother Smith smiled a lot and showed off their dimples each time. They had a son named John, who had dimples, and daughter named Julie, who did not. Julie died at an early age, but her brother John Smith met and married Mary Jones because she had the most beautiful dimples when she smiled. They had 5 children, 2 boys and 3 girls. Only one of their sons, Tom, had dimples, but both girls, Judy and Kay, had dimpled smiles. Their sister June lacked dimples. After college, Tom met and married Jane Kennedy who also had dimples. They had 3 children, all girls, who shared their parent’s dimpled smile. Tom’s sister Kay married a lawyer named James who seldom smiled and didn’t have dimples. Their only son Matthew was like his mother when he smiled. Judy never married. Tom’s sister, June, married a doctor and had 5 children. Three of the children were boys, Jay, Fred, and Mike. Mike and Fred had dimples like dad, but Jay’s smile was like his mom’s lacking dimples. One sister, Susan, had dimples, but the other, Katherine, didn’t.

**Case 5**

**Sickle Cell Anemia**

This is the story of Joan and James Williams. When James proposed marriage to Joan he explained to her that he was a carrier of the sickle cell gene. Joan who was, a biology teacher and knowledgeable in the area of Mendelian genetics was not worried about their future offspring because she knew she was not a carrier.

Three beautiful children were born to Joan and James. Their first born was a girl, Elena, followed by two precocious boys, Willie and Keith. Although Joan was not worried about the presence of sickle cell disease, she insisted on having all her children tested merely because her husband was a carrier. The results from the blood test indicated that Joan had given birth to three carriers.

All of the William’s children lead healthy productive lives and each one secured a spouse with the exception of Willie. Elena followed in her mother’s footsteps and became a biology teacher. She too insisted that her husband Eric Jackson be tested for the presence of the sickle cell gene. Fortunately, Eric’s test showed the DNA sequence for normal hemoglobin. Keith’s wife, Marsha was tested. Her results indicated she was a carrier like Keith. When Joan found out about Marsha, she advised them to talk extensively with a genetic counselor before starting a family. However Marsha’s strong belief in the family caused her to ignore her mother- in law’s advice. She simply wanted to have children, and she did, Cedric, Jeff and Nita. Unfortunately her oldest son was born with sickle cell disease, her middle child was a carrier, and the baby girl was normal.

Elena and Eric had decided to wait before starting a family, because they wanted to become financial secure and stable. After seven years of marriage they decided to start a family. Over the next six years they were blessed with four children. Nya, their oldest came into the world with normal hemoglobin, Eric Jr. and baby Shenita were both carriers, and the second son, Jason, was normal.

Aside from the normal rigors of raising a family, Eric and Elena had a good life. Although Eric Jr. and Shenita were the only siblings to marry, six grandchildren were born. Eric Jr. and wife Nicole had three girls. Their oldest children were a set of identical twins, Nina and Tina, followed by younger sister Wylona. Shenita and husband Marvin Jones (a carrier) had two girls and one boy; Mary, Susan, and Joseph. Four of the six Jackson grandchildren were carriers. Two were born to Eric Jr. and Nicole, and two were born to Shenita and Marvin. None of the Jackson grandchildren were born with sickle cell disease.

Keith and Marsha’s only child to have a carrier genotype, Jeff, did marry. Cedric remained single due to poor health, and Nita swore off marriage after several bad relationships. Jeff and his wife Adrienne had four children, Angela, Keith, Joyce, and Denise. Although the parents were not expecting it to happen, their only son and their second born girl were born with sickle cell disease.

**Case 6**

**Retinitis**

Some forms of retinitis, or a specific eye disease, are passed genetically.

Barry has retinitis while his wife, Erlinda does not. We know little about Erlindas parents except that they escaped the war-ravaged Guatemala at some point I the past. Barry’s dad can see fine, but his mom has retinitis. He has a two younger sisters, Maureen, then Jolene. Maureen is fine, but Jolene also has retinitis. She is married to Gil, a soldier. They hae a daughter, Mary, who also has retinitis. In terms of Barry and Erlinda’s children, they have identical twin sons, neither of whom have retinitis, and two older daughters, Jaclyn, and Natasha, both who have retinitis.

**Case 7**

**Hemochromatosis**

Hemachromatosis is basically a disease where the blood retains too much iron, and the skin can change to a reddish colour. Bernice married Bill, a strapping young man, with much to live for. Together, they settled far up in the mountains and had seven children. Bernice’s parents, Jack and Diane were fur traders. Her dad, Jack, looked a bit odd, having a dark tint to his skin, her mom was fine. The children of Bernice and bill, in order, are Gary, Mary, Larry, Sherry, Harry, Carrie, and Bob. Poor bob didn’t have a rhyming name. The problem was, that, as they aged, Mary, Sherry, and harry started to develop this hemochromatosis. Whats even worse, is that, living alone in the mountains led to some undesirable behaviour amongst the family. Gary married his sister Mary and they had a child, Alice. Alice had hemochromatosis. Carrie and Bob also married each other and had a child, Giuseppe (they were inspired by an Italian opera) who has hemochromatosis.